STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

STAFF SUBMITTAL

for the meeting of the
COMMISSION ON WATER RESOURCE MANAGEMENT

January 20, 2011
Honolulu, Oahu

Request to Authorize the Chairperson to
Enter into a Joint Funding Agreement with U.S. Geological Survey
To Conduct an East Maui Irrigation Diversion System
Seepage Reconnaissance Study, East Maui, Hawaii

SUMMARY OF REQUEST:

Staff is requesting that the Commission on Water Resource Management (Commission) authorize the Chairperson to enter into a Joint Funding Agreement with the U.S. Geological Survey (USGS) to conduct an East Maui Irrigation Diversion System Seepage Reconnaissance Study, East Maui, Hawaii.

BACKGROUND:

In September 2008, the Commission approved the establishment of measurable interim instream flow standards (interim IFS) for five surface water hydrologic units in east Maui.

On May 25, 2010, the Commission approved the establishment of measurable interim IFS for the remaining 16 surface water hydrologic units in east Maui, along with a number of adaptive management strategies addressing general, short-term, mid-term, and long-term implementation action, monitoring, evaluation, and reporting. One of the adaptive management strategies ordered by the Commission under Monitoring states that, "EMI, in coordination with the Commission and USGS, shall seek to cooperatively fund and undertake a system efficiency study to accurately determine EMI (East Maui Irrigation Company) systems losses and/or gains. Should such an effort not be possible, Commission staff shall report back to the Commission."

On August 4, 2010, the Commission staff met with USGS and HC&S to initiate discussions to develop a scope of work for such a study. After several meetings, USGS prepared the attached Joint Funding Agreement and Study Proposal (Exhibit 1).

SCOPE OF SERVICES:

The proposed scope of work calls for a 1.5-year study to assess, at the reconnaissance level, the amount of seepage into or from the four main ditches in the EMI system by documenting seepage rates for various construction-type sections of the ditches. The expected period of performance will be from March 1, 2011 to August 31, 2012. The total cost of the work will be $130,000, of which the Commission's share will be $86,000 and the remaining $44,000 to be provided by USGS. Results from this study, including a map characterizing construction types for the ditch system, will be published in a USGS Open-File Report and made available through the Internet.

FUNDING:

HC&S has preliminarily agreed to fund a portion of the study equaling approximately one-third of the total study cost or $43,000. Thus, the Joint Funding Agreement will be contingent upon the Commission's receipt of funds from HC&S prior to entering the Agreement.

The funds for the Commission's share, in the amount of $43,000, are available from the Department's LNR 404, Water Resources Program FY 2011 Budget.

RECOMMENDATION:

1. Staff recommends that the Commission authorize the Chairperson to enter into a Joint Funding Agreement between the Commission and the U.S. Geological Survey to conduct an East Maui Irrigation Diversion System Seepage Reconnaissance Study, East Maui, Hawaii.

The terms of these agreements will be subject to the availability of funding and the approval of the Chairperson and the Department's Deputy Attorney General.

Respectfully submitted,

WILLIAM M. TAM
Interim Deputy Director

Exhibit 1. USGS Joint Funding Agreement and Proposal for East Maui Irrigation System Seepage Reconnaissance Study, East Maui, Hawaii, December 2010

APPROVED FOR SUBMITTAL:

WILLIAM J. AILA, JR.
Interim Chairperson

Form 9-1366
(Oct. 2005)

U.S. Department of the Interior
U.S. Geological Survey
Joint Funding Agreement

Customer #:	6000001189
Agreement #:	11WSHI000000003
Project #:	ZH00EEA
TIN #:	99-0266119
Fixed Cost Agreement	☑ Yes ☐ No

FOR
WATER RESOURCES INVESTIGATIONS

THIS AGREEMENT is entered into as of the . day of January, 2011, by the U.S. GEOLOGICAL SURVEY, UNITED STATES DEPARTMENT OF THE INTERIOR, party of the first part, and the COMMISSION ON WATER RESOURCE MANAGEMENT, DEPARTMENT OF LAND AND NATURAL RESOURCES, STATE OF HAWAI'I, party of the second part.

1. The parties hereto agree that subject to availability of appropriations and in accordance with their respective authorities there shall be maintained in cooperation a study to assess the amount of seepage into or from the four main ditches in the East Maui Irrigation Company's diversion system, herein called the program. The USGS legal authority is 43 USC 36C; 43 USC 50; and 43 USC 50b.
2. The following amounts shall be contributed to cover all of the cost of the necessary field and analytical work directly related to this program. 2(b) includes In-Kind Services in the amount of $0.00.

(a) $44,000.00 by the party of the first part during the period March 1, 2011 **to** August 31, 2012

(b) $86,000.00 by the party of the second part during the period March 1, 2011 **to** August 31, 2012

(c) Additional or reduced amounts by each party during the above period or succeeding periods as may be determined by mutual agreement and set forth in an exchange of letters between the parties.

(d) The performance period may be changed by mutual agreement and set forth in an exchange of letters between the parties.

3. The costs of this program may be paid by either party in conformity with the laws and regulations respectively governing each party.
4. The field and analytical work pertaining to this program shall be under the direction of or subject to periodic review by an authorized representative of the party of the first part.
5. The areas to be included in the program shall be determined by mutual agreement between the parties hereto or their authorized representatives. The methods employed in the field and office shall be those adopted by the party of the first part to insure the required standards of accuracy subject to modification by mutual agreement.
6. During the course of this program, all field and analytical work of either party pertaining to this program shall be open to the inspection of the other party, and if the work is not being carried on in a mutually satisfactory manner, either party may terminate this agreement upon 60 days written notice to the other party.
7. The original records resulting from this program will be deposited in the office of origin of those records. Upon request, copies of the original records will be provided to the office of the other party.

EXHIBIT 1

Form 9-1366 continued

U.S. Department of the Interior
U.S. Geological Survey
Joint Funding Agreement

Customer #:	**6000001189**
Agreement #:	**11WSHI000000003**
Project #:	**ZH00EEA**
TIN #:	**99-0266119**

8. The maps, records, or reports resulting from this program shall be made available to the public as promptly as possible. The maps, records, or reports normally will be published by the party of the first part. However, the party of the second part reserves the right to publish the results of this program and, if already published by the party of the first part shall, upon request, be furnished by the party of the first part, at costs, impressions suitable for purposes of reproduction similar to that for which the original copy was prepared. The maps, records, or reports published by either party shall contain a statement of the cooperative relations between the parties.
9. USGS will issue billings utilizing Department of the Interior Bill for Collection (form DI-1040). Billing documents are to be rendered **quarterly**. Payments of bills are due within 60 days after the billing date. If not paid by the due date, interest will be charged at the current Treasury rate for each 30 day period, or portion thereof, that the payment is delayed beyond the due date. (31 USC 3717; Comptroller General File B-212222, August 23, 1983).

U.S. Geological Survey
United States
Department of the Interior

USGS Point of Contact

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Signatures

By /s/ Stephen S. Anthony Date 12/10/10
Name: Stephen S. Anthony
Title: Center Director

By_____ Date_____
Name:
Title:

By_____ Date_____
Name:
Title:

Commission on Water Resource Management
Department of Land and Natural Resources
State of Hawai'i

Customer Point of Contact

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Signatures

By_____ Date_____
Name:
Title:

By_____ Date_____
Name:
Title:

By_____ Date_____
Name:
Title:

East Maui Irrigation Diversion System Seepage Reconnaissance Study, East Maui, Hawai'i

U.S. Geological Survey
Pacific Islands Water Science Center
Proposal, December 2010

SUMMARY

East Maui Irrigation Company's system, which consists of about 75 miles of ditch, diverts stream water and transports it to central Maui for sugarcane cultivation, general agriculture, and domestic use through the public water system(s). The State of Hawai'i Commission on Water Resource Management desires information on the seepage (losses/gains) rates of the ditch system to help in evaluating instream flow standards for the streams diverted by the ditch system. The objective of this 1.5-year study is to assess, at the reconnaissance level, the amount of seepage into or from the four main ditches in the East Maui Irrigation Company system by documenting seepage rates for various construction-type sections of the ditches.

Results from this study will be useful to the State of Hawai'i Commission on Water Resource Management for determining system efficiency and will aid in the management of surface-water resources in east Maui. Results will be published in the U.S. Geological Survey Open-File Report series and made available through the Internet. The study will take 1.5 years from the time work is commenced until the report is published and will cost $130,000.

PROBLEM

For over a century, the East Maui Irrigation Company's (EMI) surface-water diversion systems have diverted water from streams in east Maui, Hawai'i for large-scale sugarcane cultivation by Hawaii Commercial and Sugar Company (HC&S) and for general agriculture and domestic use through the public water system(s). The EMI System consists of about 75 miles of ditches, which are used to collect and transport water from as far east as Nāhiku to west of Māliko Gulch. About 50 miles of the ditches are tunnels and 25 miles are open. The system has four main ditches, Ko'olau/Wailoa, New Hāmākua, Lowrie, and Ha'ikū Ditches (listed from highest to lowest elevation) with several additional ditches also connected to the main ditches (Kauhikoa, Center, Manuel Luis, and Spreckels Ditches). The New Hāmākua and Ha'ikū Ditches are considered overflow ditches that collect high flows that overflow the Ko'olau/Wailoa and Lowrie Ditches, respectively. Recently, the State of Hawai'i Commission on Water Resource Management (CWRM) established interim instream flow standards for many of the streams diverted by ditches in the EMI system. Part of the CWRM's decision ordered that "EMI, in coordination with the Commission and USGS, shall seek to cooperatively fund and undertake a system efficiency study to accurately determine EMI system losses and/or gains." (CWRM May 25, 2010 staff submittal). EMI reports that through a program of regular inspection and maintenance, water losses in the ditch system are minimized however they are unable to provide measurements or estimates documenting their system efficiency (Hawaiian Commercial and Sugar Company, 2010). Therefore, measurements of EMI's ditch system seepage rates are desirable to address the CWRM's order.

OBJECTIVES

The objectives of this 1.5-year study is to assess, at the reconnaissance level, the amount of losses or gains from the four main ditches in the EMI system in east Maui by documenting seepage rates for various construction-type sections of the ditches. Results from this study will be useful for determining system efficiency and will aid in the management of surface-water resources in east Maui. This study will not address the loss rates from reservoirs that receive water from or are part of the EMI system.

APPROACH

The four major ditch systems (Ko'olau/Wailoa, New Hāmākua, Lowrie, and Ha'ikū Ditches) will be characterized in their entirety from Makapipi Stream to Māliko Gulch using visual observations and handheld GPS equipment. Ditch sections will be characterized as lined, partially lined, or unlined based on definitions provided in figure 1. Three representative sections of each ditch-construction type will be selected and a series of flow measurements will be made in each selected section to determine the seepage rate for each type. Flow measurements will be made during stable conditions near median flow for each ditch and all surface-water inflows and outflows in each measurement section will be accounted for to ensure that changes in flow measured in the section are due only to seepage through the ditch walls and floor. Measurement sections will be selected to minimize surface water inflows and outflows, thereby minimizing the inherent error introduced with each additional measurement. Every effort will be made to choose representative sections that are as long as possible to increase the possibility of measuring average seepage conditions and minimize the effects of anomalous localized conditions on the overall average rates. To facilitate the fieldwork, the USGS will collaborate closely with EMI

staff to assist in the mapping survey, to discuss selection of representative sections for flow measurements, and maintain safety during all operations around the ditches.

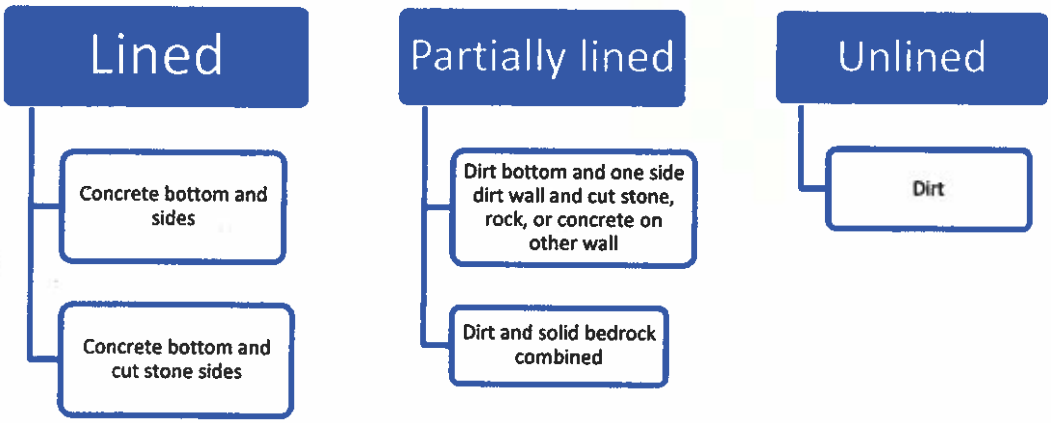

Figure 1. Categories of ditch-construction types in the East Maui Irrigation System, east Maui, Hawai'i.

Three estimates of system seepage losses (or gains) will be provided using the lengths of each construction type combined with: (1) the average seepage rates for each construction type; (2) the lowest seepage rates for each construction type; and (3) the highest seepage rates for each construction type. Estimates of system seepage losses (or gains) will be applied to the unmeasured sections of the system. Actual seepage losses (or gains) will be applied to the sections measured.

REPORT

Results from this study, including a map characterizing construction types for the ditch system and seepage measurement results will be published in a USGS Open-File Report and made available through the Internet. The probable report title and milestone dates are listed in table 1. The first draft of the report shall be provided to EMI and CWRM for comment on factual information contained in the report.

Table 1. Milestone dates for planned report

Probable title	Report outlet	First draft	Review	Approval	Publication
East Maui Irrigation Diversion System Seepage Measurements, East Maui, Hawai'i	USGS OFR	03/31/12	05/31/12	06/30/12	08/31/12

BUDGET

It is anticipated that a total of $130,000 is needed for this 1.5-year study. The breakdown is provided in table 2.

Table 2. Project budget

Category	Total
Labor	99,350
Travel	18,500
Communications	100
Supplies	500
Report processing	2,000
Science Support	9,550
Total	130,000

WORK PLAN

The major tasks and associated periods of activity for this study are summarized in table 3.

Table 3. Major tasks and timelines

Task	03/01/11	04/01/11	05/01/11	06/01/11	07/01/11	08/01/11	09/01/11	10/01/11	11/01/11	12/01/11	01/01/12	02/01/12	03/01/12	04/01/12	05/01/12	06/01/12	07/01/12	08/01/12
Ditch Characterization	X	X	X	X	X													
Flow Measurements				X	X	X	X	X	X									
Report writing									X	X	X	X	X					
Peer review														X	X			
Report approval																X		
Publication																	X	X

REFERENCES CITED

Department of Agriculture, 2003, Agricultural Water Use and Development Plan: Honolulu, Hawaii, 145 p.

Department of Land and Natural Resources, 2010, News Release–State Water Commission decision balances competing demands: May 28, 2010, Honolulu, Hawaii.

Hawaiian Commercial and Sugar Company, 2010, Appendix B–water lost from the EMI System: submission to Commission on Water Resource Management March 19, 2010: http://hawaii.gov/dlnr/cwrm/currentissues/iifsmaui1/data/20100319_HC&Sb.pdf.

U.S. Geological Survey, 2007, Facing Tomorrow's Challenges–U.S. Geological Survey Science in the Decade 2007–2017: U.S. Geological Survey Circular 1309, 69 p., available at http://pubs.usgs.gov/circ/2007/1309/.

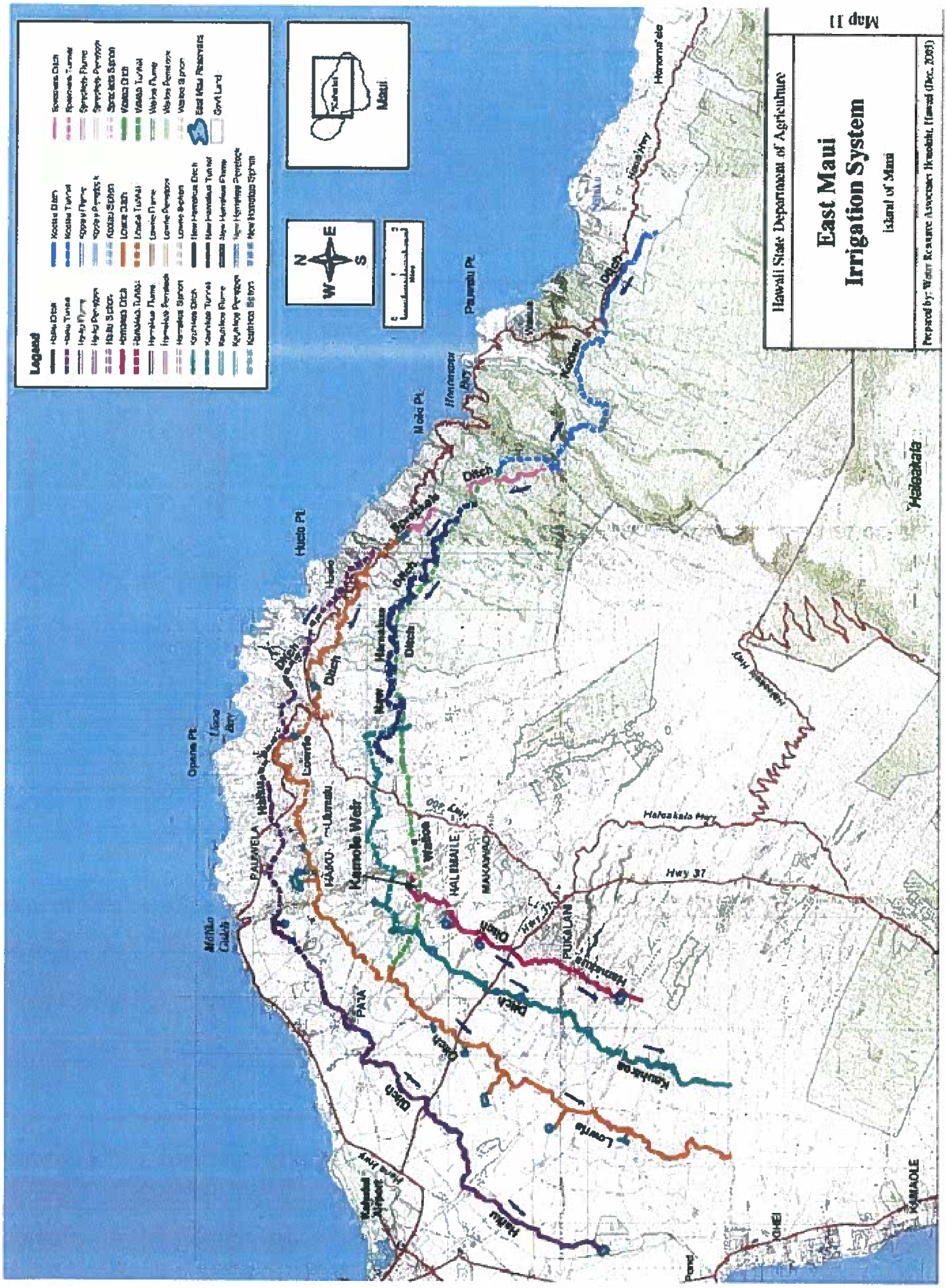

Figure 2. Schematic of the East Maui Irrigation System, island of Maui, Hawai'i. Modified from Department of Agriculture, 2003.